

CLAIMS

1. A method for screening for the effect of a test agent on a population of insects comprising
providing a population of insects;
administering at least one test agent to said population;
creating a digital image showing at least one trait of specimens in the population; and
correlating the traits of the population with the effect of the test agent(s) administered to the population.
2. A method for screening for the effects of a test agent on a population of insects comprising
providing a plurality of populations of insects;
administering at least one test agent to each of said populations;
creating a digital image showing at least two traits of specimens in each population;
for each population, correlating the traits of the population with the effect of the test agent(s) administered to the population.
3. The method of claim 1 further comprising the step of determining at least one trait of said population.
4. The method of claim 2 further comprising the step of determining at least two traits of each population.
5. The method of claim 1 or 2 wherein said trait is selected from the group consisting of total distance traveled over a defined period of time, distance traveled in X direction over a defined period of time; distance traveled in Y direction over a defined period of time; total distance moved per time unit; distance moved in X direction per time unit; distance moved in Y direction per time unit); the rate of change of velocity per time unit, turning, stumbling, spatial position, and path shape.

6. The method of claim 1 or 2 wherein said step of determining comprises measuring data selected from the group consisting of X-pos, X-speed, speed, turning, stumbling, size, T-count, P-count, T-length, Cross150, Cross250, and F-count.
7. The method of claim 1 or 2 wherein said trait is selected from the group consisting of movement of one insect toward or away from another insect, occurrence of no relative spatial displacement of two insects, occurrence of two insects within a defined distance from each other, and occurrence of two insects more than a defined distance away from each other.
8. The method of claim 1 or 2, wherein said trait is a morphological trait.
9. A method for ranking test agents comprising

providing a plurality of populations of insects;

contacting each of the populations with a different test agent;

determining at least one trait for each of said population to produce an agent phenoprofile; and

ranking said test agents according to the similarity or difference of each agent phenoprofile with a reference phenoprofile defined by said at least one trait as measured in a reference population of insects.
10. A method of screening for an agent with a desired biological activity comprising:

providing a plurality of populations of insects;

contacting each of said populations with a different test agent;

determining an agent phenoprofile for each of said populations, wherein the agent phenoprofile comprises a quantitative description of one or more traits exhibited by insects in the population;

comparing the agent phenoprofile to a reference phenoprofile, wherein the reference phenoprofile comprises a quantitative description of said one or more traits exhibited by insects in a reference population; and

selecting said agent based on the comparison of the agent phenoprofile and the reference phenoprofile corresponding to each agent.

11. The method of claim 9 or 10 wherein said trait is selected from the group consisting of total distance traveled over a defined period of time, distance traveled in X direction over a defined period of time; distance traveled in Y direction over a defined period of time; total distance moved per time unit; distance moved in X direction per time unit; distance moved in Y direction per time unit); the rate of change of velocity per time unit, turning, stumbling, spatial position, and path shape.

12. The method of claim 9 or 10 wherein said step of determining comprises measuring data selected from the group consisting of X-pos, X-speed, speed, turning, stumbling, size, T-count, P-count, T-length, Cross150, Cross250, and F-count.

13. The method of claim 9 or 10 wherein said trait is selected from the group consisting of movement of one insect toward or away from another insect, occurrence of no relative spatial displacement of two insects, occurrence of two insects within a defined distance from each other, and occurrence of two insects more than a defined distance away from each other.

14. The method of claim 9 or 10 wherein said trait is a morphological trait.

15. A method of screening for an agent with a desired biological activity comprising:

providing a population of insects;

contacting said population with a test agent;

determining an agent phenoprofile for said population, wherein the agent phenoprofile comprises a quantitative description of one or more traits exhibited by insects in said population;

comparing the agent phenoprofile to a reference phenoprofile, wherein the reference phenoprofile comprises a quantitative description of said one or more traits exhibited by insects in a reference population; and

selecting said agent based on the comparison of the agent phenoprofile and the reference phenoprofile corresponding to said agent.

16. The method of claim 15 wherein said trait is selected from the group consisting of total distance traveled over a defined period of time, distance traveled in X direction over a defined period of time; distance traveled in Y direction over a defined period of time; total distance moved per time unit; distance moved in X direction per time unit; distance moved in Y direction per time unit); the rate of change of velocity per time unit, turning, stumbling, spatial position, and path shape.

17. The method of claim 15 wherein said step of determining comprises measuring data selected from the group consisting of X-pos, X-speed, speed, turning, stumbling, size, T-count, P-count, T-length, Cross150, Cross250, and F-count.

18. The method of claim 15 wherein said trait is selected from the group consisting of movement of one insect toward or away from another insect, occurrence of no relative spatial displacement of two insects, occurrence of two insects within a defined distance from each other, and occurrence of two insects more than a defined distance away from each other.

19. The method of claim 15, wherein said trait is a morphological trait.

20. A method for determining parameters useful for a phenoprint comprising:

measuring a plurality of traits in a first population of insects, said first population having a first phenoprofile;

measuring said traits in a second population of insects, said second population having a second phenoprofile;

comparing the traits of the first population and the second population; and

identifying one or more traits that are different in said first and second populations, said one or more different traits defining the phenoprint.

21. The method of claim 1 or 9, wherein said step of determining comprises determining more than one trait.

22. The method of claim 21, wherein said at least two traits define a phenoprint.

23. A method for determining whether a test agent modifies, delays or prevents onset of a phenotype in a transgenic insect comprising:

providing a population of transgenic insects, wherein the population develops a phenotype due to expression of a transgene;

contacting said population with a test agent;

for the population contacted with the test agent, determining an agent phenoprofile for the population at a plurality of times during the life of the insect;

comparing the agent phenoprofile generated at each of the plurality of times to a reference phenoprofile generated at each of the plurality of times for a reference population, wherein the reference population consists of insects not contacted with said test agent; and

determining whether said test agent modifies, delays or prevents onset of a trait in said population contacted with a test agent compared to said reference population.

24. A method of preparing a medicament for use in treatment of a disease in mammals comprising

providing a population of insects with a phenotype with characteristics of a mammalian disease;

contacting said population with a test agent;

determining an agent phenoprofile for said population, wherein the agent phenoprofile comprises a quantitative description of one or more traits exhibited by insects in said population;

comparing the agent phenoprofile to a reference phenoprofile, wherein the reference phenoprofile comprises a quantitative description of said one or more traits exhibited by specimens in a reference population; and

selecting said agent based on the comparison of the agent phenoprofile and the reference phenoprofile corresponding to said agent; and

formulating said agent for administration to a mammal.

25. The method of claim 23 or 24 wherein said trait is selected from the group consisting of total distance traveled over a defined period of time, distance traveled in X direction over a defined period of time; distance traveled in Y direction over a defined period of time; total distance moved per time unit; distance moved in X direction per time unit; distance moved in Y direction per time unit); the rate of change of velocity per time unit, turning, stumbling, spatial position, and path shape.

26. The method of claim 23 or 24 wherein said step of determining comprises measuring data selected from the group consisting of X-pos, X-speed, speed, turning, stumbling, size, T-count, P-count, T-length, Cross150, Cross250, and F-count.

27. The method of claim 23 or 24 wherein said trait is selected from the group consisting of movement of one insect toward or away from another insect, occurrence of no relative spatial displacement of two insects, occurrence of two insects within a defined distance from each other, and occurrence of two insects more than a defined distance away from each other.

28. The method of claim 23 or 24, wherein said trait is a morphological trait.

29. The method of claim 1, 2, 9, 10, 15, 20, 23, or 24 wherein said insect is a fly.

30. The method of claim 29, wherein said fly is *Drosophila*.

31. The method of claim 1, 2, 9, 10, 15, 20, or 24, wherein said insect is transgenic.

32. The method of claim 31, wherein said insect is transgenic for a gene encoding a polypeptide with an expanded polyglutamine tract as compared to the wild-type polypeptide.

33. The method of claim 32, wherein the expression of the transgene results neurodegeneration in said specimen.

34. The method of claim 1, 2, 9, 10, 15, 20, or 24 wherein said insect comprises a genetic mutation resulting in a loss of function or a gain of function.

35. The method of claim 9, 10, 15, 23, or 24, wherein said insect is a transgenic fly, and said reference population is selected from the group consisting of (i) transgenic flies not contacted with a test agent; (ii) transgenic flies contacted with an agent with a known activity on said flies; (iii) nontransgenic flies with the genetic background of the transgenic flies; or (iv) transgenic flies not expressing a disease gene and not contacted with a test agent.

36. The method of claim 9, 10, 15, 23, or 24, wherein said reference population is selected from the group consisting of (i) flies comprising a genetic mutation not contacted with a test agent; (ii) flies comprising a genetic mutation contacted with an agent with a known activity on said flies; or (iii) flies without the genetic mutation.